and idle, a bypass valve **110** can be operated to enable the coolant to bypass the heat exchanger, thereby modulating the coolant temperature. This bypass feature avoids overheating of the fuel which is passing through the heat exchanger at a relatively low rate reflecting the low power state of the engine, which overheating could create fuel system problems.

The preferred embodiment has been described in detail hereinabove for the purpose of illustration only. Various modifications could be made to the above-described structure without departing from the spirit and scope of the invention as defined in the claims set forth hereinafter. For example, while the present invention has been depicted as integral part of a gas turbo-fan engine, it will be apparent to those skilled in the art of gas turbine engines that the present invention is equally applicable to engines of the gas turbojet variety, gas turbofan engines having three or more spools, or marine and industrial gas turbines. For marine and industrial engines, it is possible to use water and atmospheric air, respectively, as a secondary or alternative heat sink.

I claim:

1. A gas turbine engine comprising a compressor for compressing air and having a rotor, a turbine having a rotor with a plurality of air-cooled rotor blades, a casing which encases said compressor, a first heat exchanger mounted outside said casing and having a chamber with an inlet and an outlet, means for bleeding air from an intermediate stage of said compressor, means for supplying said compressor bleed air to said chamber inlet of said first heat exchanger, and means for circumferentially distributing said compressor bleed air from said chamber outlet of said first heat exchanger to an annular cavity surrounding a shaft by which said turbine rotor drives said compressor rotor and means for impelling said cooled compressor bleed air radially outward, further increasing its pressure, through a plurality of hollow radial spokes to said air-cooled rotor blades, said first heat exchanger further having an inlet for receiving a first fluid inert medium and having a temperature lower than the temperature of said bleed air and a heat exchange circuit communicating with said fluid medium inlet for conducting heat from said bleed air to said first fluid medium, whereby said first fluid medium is heated and said compressor bleed air is cooled.

2. The gas turbine engine as defined in claim **1**, wherein said first fluid medium is water.

3. The gas turbine engine as defined in claim **1**, wherein said first fluid medium is air.

4. The gas turbine engine as defined in claim **1**, wherein said first heat exchanger places said first fluid medium and said compressor bleed air in counterflow heat exchange relationship.

5. The gas turbine engine as defined in claim **1**, wherein said means for supplying said compressor bleed air to said chamber inlet of said first heat exchanger comprises an annular manifold in fluid communication with said compressor via a plurality of outlets formed in said casing.

6. The gas turbine engine as defined, in claim **1**, further comprising a second heat exchanger mounted outside said engine casing and having a chamber with an inlet and an outlet, and means for supplying a second fluid medium to said chamber inlet of said second heat exchanger, wherein said second fluid medium has a temperature lower than the temperature of said first fluid medium and said second heat exchanger further has a heat exchange circuit which is in fluid communication with said heat exchange circuit of said first heat exchanger, thereby forming a closed circuit which carries said first fluid medium, whereby said second fluid medium is heated in said second heat exchanger by conduction of heat from said first fluid medium.

7. The gas turbine engine as defined in claim **6**, further comprising a combustor and means for transporting said second fluid medium from said chamber outlet of said second heat exchanger to said combustor, said first fluid medium being inert and said second fluid medium being fuel.

8. A system for feeding cooling air to the rotor blades of a turbine in a gas turbine engine having a compressor for compressing air and a combustor for burning a mixture of pressurized air and fuel, comprising:

means for bleeding air from an intermediate stage of said compressor;

a first heat exchanger having a chamber with an inlet and an outlet;

means for supplying said compressor bleed air from an intermediate stage of compressor to said chamber inlet of said first heat exchanger;

means for circumferentially distributing said compressor bleed air from said chamber outlet of said first head exchanger to an annular cavity surrounding a shaft by which said turbine rotor drives said compressor rotor; and

means for impelling said cooled compressor bleed air radially outward, further increasing its pressure, through a plurality of hollow radial spokes to said rotor blades,

wherein said first heat exchanger further has an inlet for receiving an inert fluid medium having a temperature lower than the temperature of said bleed air and a heat exchange circuit communicating with said fluid medium inlet for conducting heat from said bleed air to said inert fluid medium, whereby said inert fluid medium is heated and said compressor bleed air is cooled.

9. The cooling air feed system as defined in claim **8**, wherein said first heat exchanger places said inert fluid medium and said compressor bleed air in counterflow heat exchange relationship.

10. The cooling air feed system as defined in claim **8**, wherein said means for supplying said compressor bleed air to said chamber inlet of said first heat exchanger comprises an annular manifold in fluid communication with said compressor.

11. The cooling air feed system as defined in claim **8**, further comprising a second heat exchanger having a chamber with an inlet and an outlet, means for supplying fuel to said chamber inlet of said second heat exchanger, and means for transporting said fuel from said chamber outlet of said second heat exchanger to said combustor, wherein said fuel has a temperature lower than the temperature of said inert fluid medium and said second heat exchanger further has a heat exchange circuit in fluid communication with said heat exchange circuit of said first heat exchanger, thereby forming a closed circuit which carries said inert fluid medium, whereby said fuel is heated before being transported to said combustor by conduction of heat from said inert fluid medium.

12. The cooling air feed system as defined in claim **8**, wherein said fluid medium is water.

13. The cooling air feed system as defined in claim **8**, wherein said fluid medium is antifreeze.